S A P I E N T

R A Z O R F I S H \_

**Classroom Training Content for Campus Hires (Content SCG)**

*A specialized content on Java & Web Technologies for SapientRazorfish*

# Some facts on the Training Program

## Recipients

The attendees and recipients of the Training Program are fresh College Graduates or Interns from renowned Engineering Colleges of India; with no professional experience.

## Consumers

The practices where the trainees would get consumed into after their classroom training are typically Commerce & Content or with SI where there is consulting needs for Java developers.

## Limitations

The training typically covers the pre-requisites before they get trained and start working on SCG specific technologies by the respective teams once they hit the Shadow Training Program.

Contents

[Some facts on the Training Program 2](#_Toc499117332)

[Recipients 2](#_Toc499117333)

[Consumers 2](#_Toc499117334)

[Limitations 2](#_Toc499117335)

[Classroom Training Structure 7](#_Toc499117336)

[Day Wise Classroom Program 8](#_Toc499117337)

[Day 1 – OOAD & UML 9](#_Toc499117338)

[Object Oriented Analysis and Design 9](#_Toc499117339)

[Fundamentals of UML 9](#_Toc499117340)

[UML Diagrams 9](#_Toc499117341)

[Day 2 – RDBMS Concepts 10](#_Toc499117342)

[Introduction to RDBMS 10](#_Toc499117343)

[Introduction to SQL 10](#_Toc499117344)

[Database Views 10](#_Toc499117345)

[Day 3 - Working with Git 11](#_Toc499117346)

[Git (Configuration Management) 11](#_Toc499117347)

[Eclipse & GIT 11](#_Toc499117348)

[Day 4 – Java (Version 8 ONLY) 12](#_Toc499117349)

[Introduction to Java 12](#_Toc499117350)

[Class Design 12](#_Toc499117351)

[Day 5 – Java continued 13](#_Toc499117352)

[Polymorphism 13](#_Toc499117353)

[Inheritance 13](#_Toc499117354)

[Abstraction 13](#_Toc499117355)

[Encapsulation 13](#_Toc499117356)

[Day 6 – Java continued 14](#_Toc499117357)

[Static 14](#_Toc499117358)

[Interfaces 14](#_Toc499117359)

[Lambda Expressions 14](#_Toc499117360)

[Day 7 – Java continued 15](#_Toc499117361)

[Exception Handling 15](#_Toc499117362)

[Day 8 – Java Inbuilt packages 16](#_Toc499117363)

[java.lang 16](#_Toc499117364)

[java.io 16](#_Toc499117365)

[java.util 16](#_Toc499117366)

[Day 9 – Java Inbuilt packages 17](#_Toc499117367)

[java.util.stream 17](#_Toc499117368)

[java.util.concurrent 17](#_Toc499117369)

[Day 10 – Java Inbuilt Packages 18](#_Toc499117370)

[java.nio 18](#_Toc499117371)

[java.time 18](#_Toc499117372)

[Day 11 – JDBC (Java SQL Package) 19](#_Toc499117373)

[JDBC 19](#_Toc499117374)

[Day 12 – Maven 20](#_Toc499117375)

[Introduction to Maven (version – 3.3.3) 20](#_Toc499117376)

[Day 13 – Unit Testing with JUnit (Version 5.0) 21](#_Toc499117377)

[Introduction to Testing 21](#_Toc499117378)

[Working with JUnit 5 21](#_Toc499117379)

[Day 14 – Testing using Mockito API 22](#_Toc499117380)

[Mockito Framework (version – 2.2.26) 22](#_Toc499117381)

[Day 15 – SL4J and Logback 23](#_Toc499117382)

[Introduction to SL4J (version - 1.7.23) 23](#_Toc499117383)

[Day 16 & 17 – Design Patterns & Principles 24](#_Toc499117384)

[Overview of Design Pattern 24](#_Toc499117385)

[SOLID Design Principles 24](#_Toc499117386)

[Day 18 –HTML5 25](#_Toc499117387)

[Introduction to HTML5 25](#_Toc499117388)

[Formatting tags, Links & Lists 25](#_Toc499117389)

[Tables 25](#_Toc499117390)

[Forms 25](#_Toc499117391)

[Media Elements 25](#_Toc499117392)

[Overview of canvas 25](#_Toc499117393)

[Day 19 –CSS 26](#_Toc499117394)

[Cascading Style Sheet (CSS) 26](#_Toc499117395)

[Day 20 – JavaScript 27](#_Toc499117396)

[Introduction to JavaScript 27](#_Toc499117397)

[JavaScript deep dive 27](#_Toc499117398)

[Event Handling 27](#_Toc499117399)

[Form validation using DOM 27](#_Toc499117400)

[Day 21 – JavaScript Objects, Basics of JSON, XML, AJAX 28](#_Toc499117401)

[JavaScript Objects 28](#_Toc499117402)

[Objects 28](#_Toc499117403)

[Understanding DOM 28](#_Toc499117404)

[Using Cookie 28](#_Toc499117405)

[Web storage API for HTML 28](#_Toc499117406)

[JSON 28](#_Toc499117407)

[Overview of XML 28](#_Toc499117408)

[Overview of AJAX 28](#_Toc499117409)

[Day 22 – Java EE 29](#_Toc499117410)

[Overview of different Architectures 29](#_Toc499117411)

[Overview of JEE technologies 29](#_Toc499117412)

[Introduction to Servlet API 29](#_Toc499117413)

[Day 23 – Java EE 30](#_Toc499117414)

[Session tracking in Servlets 30](#_Toc499117415)

[Java Server Pages 30](#_Toc499117416)

[Developing Java Server Pages 30](#_Toc499117417)

[Day 24 – Java Server Pages 31](#_Toc499117418)

[Using Expression Language 31](#_Toc499117419)

[Tags in JSP 31](#_Toc499117420)

[Day 25 – Web Services & REST 32](#_Toc499117421)

[Introduction to web services 32](#_Toc499117422)

[Introduction to REST 32](#_Toc499117423)

[Day 26 - JCR & Jackrabbit 33](#_Toc499117424)

[Understanding Content 33](#_Toc499117425)

[Java Content Repository 33](#_Toc499117426)

[Apache Jackrabbit 33](#_Toc499117427)

[Day 27 - Modularity & OSGi 34](#_Toc499117428)

[Modularity Concepts 34](#_Toc499117429)

[Introduction to OSGi 34](#_Toc499117430)

[OSGi Bundles 34](#_Toc499117431)

[OSGi Services 34](#_Toc499117432)

[OSGi and Components 34](#_Toc499117433)

[Day 28 [Half-day] - NoSQL databases 35](#_Toc499117434)

[NoSQL Database 35](#_Toc499117435)

[Document Oriented Database 35](#_Toc499117436)

[*Suggested Self-Study topics in NoSQL databases* 35](#_Toc499117437)

[Day 28 [Half-day] - Server Side Scripting Basics 35](#_Toc499117438)

[Server-side Scripting 35](#_Toc499117439)

[Server-side Scripting in Java 35](#_Toc499117440)

[Server-side JavaScript 35](#_Toc499117441)

# Classroom Training Structure

The classroom training is structured into six basic categories spanned across the training cycle:

* **Core Java & Unit Testing** 
  + Core Java
  + Junit & Mockito
* **Enterprise Frameworks** 
  + Git
  + RDBMS Basics
  + Maven & SL4J
* **Software Design Basics** 
  + OOAD & UML
  + Design Patterns
  + SOLID Design Principles
  + Code Smells
* **Ace the Web** 
  + HTML & CSS
  + JavaScript
  + XML, JSON & Ajax
* **Web Architectures** 
  + JEE (Servlets & JSP)
  + REST API
* **Understanding the Content** 
  + JCR & Jackrabbit
  + Modularity & OSGi
  + Server-side Scripting Basics
  + NoSQL Databases

# Day Wise Classroom Program

|  |  |  |  |
| --- | --- | --- | --- |
| Day 01 | OOAD & UML | Day 15 | SLF4j |
| Day 02 | RDBMS | Day 16 | Design Patterns |
| Day 03 | GIT | Day 17 | Design Patterns |
| Day 04 | Java | Day 18 | HTML5 |
| Day 05 | Java | Day 19 | CSS |
| Day 06 | Java | Day 20 | JavaScript |
| Day 07 | Java | Day 21 | Basics of JSON, XML,AJAX |
| Day 08 | Java | Day 22 | JEE & JSP |
| Day 09 | Java | Day 23 | JEE & JSP |
| Day 10 | Java | Day 24 | JEE & JSP |
| Day 11 | Java | Day 25 | Web Services & REST |
| Day 12 | Maven | Day 26 | JCR & Jackrabbit |
| Day 13 | Junit | Day 27 | Modularity & OSGi |
| Day 14 | Mockito | Day 28 | No SQL DB Basics & Server Side Scripting |

## Day 1 – OOAD & UML

### Object Oriented Analysis and Design

* Introduction to Object Oriented Analysis & Design (OOAD)
* Classes and Objects
* Object oriented concepts

### Fundamentals of UML

* Introduction to UML
* Goals of UML
* Use Case Modeling

### UML Diagrams

* Structure Diagrams
  + Class and Object Diagrams
  + Component and Deployment Diagram
* Behavior Diagrams
  + Use Case specifications
  + Interaction Diagrams - Sequence and Collaboration
  + Activity Diagram
* Associations (Composition and Aggregation)

## Day 2 – RDBMS Concepts

### Introduction to RDBMS

* Overview of Database Models
* Overview of ER Diagram and Normalization

### Introduction to SQL

* Oracle Data types
* Introduction to DQL, DDL, DML, DCL
* CRUD operations with database
  + INSERT/UPDATE/DELETE/RETRIEVE
* Using functions and ordering the result
  + Average(), Count(), Maximum(), Median(), Minimum(), Mode(), Sum()
  + Group By, Order By, Having
* Use of **LIKE** & **WHERE** clause
* Dropping / truncating a table
* SQL Joins - Inner, Outer and Self joins
* Sub queries – single row, multiple row, correlated

### Database Views

* Introduction to views
* Scenarios when views are used

## Day 3 - Working with Git

### Git (Configuration Management)

* Basics of Software Configuration Management
* Basics of Version Control System
  + Centralized version control system
  + Distributed/Decentralized version control system
* How to install, configure and create repository
* Working copy and check out
* Review, Commit & Update
* How to merge code and avoid conflict?
* Complete Hands-on coverage with GIT on the highlighted areas

### Eclipse & GIT

* Install Eclipse
* Introduction to Eclipse and its capabilities
* Mapping Git with Eclipse

## Day 4 – Java (Version 8 ONLY)

### Introduction to Java

* Features of Java 8
* JDK, JRE and JVM
* OOPs
  + Class, Object, Attribute, method
  + Access Modifiers – Private, Public
* Data types and Operators
* Arrays
  + Primitive, Class, Array Types
  + Elements
* Control Flow statements
  + If, Switch, For, While, and Do
  + Enhanced For Loop
* Enums

### Class Design

* Class and Objects
* Instance Variables and Static Variables
* Methods and Constructors

## Day 5 – Java continued

### Polymorphism

* Method Overloading
* Constructor Overloading
* Use of “this**”** keyword
* Variable Argument Method (Varargs) in Java
* Varargs vs Overloading

### Inheritance

* Inheritance Basics
* Use of super keyword
* Overriding
* Runtime Polymorphism

### Abstraction

* Abstract classes and methods
* Final classes and methods

### Encapsulation

* Packages and Access Specifiers
* What is a java bean?

## Day 6 – Java continued

### Static

* Static variables, Static block and methods
* Static Import

### Interfaces

* Understanding interfaces
* Extending Interfaces
* Functional Interfaces
* Default methods in interfaces

### Lambda Expressions

* What is Lambda Expression?
* Syntax, structure and usage
* When to use Lambda?

## Day 7 – Java continued

### Exception Handling

* Exception and Errors
* Checked and Unchecked Exception
* Handling exceptions using try,catch and finally
* Using Multicatch
* Use of throw and throws
* Automatic Resource Management – Try with resources
* Creating Custom Exceptions

**Multithreading** **Basics**

* Overview of Multithreading
* Process vs Thread
* Main Thread, priorities
* Creating child threads – extending Thread
* Creating child threads – Implementing Runnable
* Synchronization
* Daemon Thread

## Day 8 – Java Inbuilt packages

### java.lang

* Wrapper classes
* Autoboxing and Unboxing
* Object class
* Shallow Cloning – overview and example
* Use of equals and hashcode
* Understanding toString() method
* String, String Buffer and String Builder

### java.io

* Overview of Byte Streams and Character Streams
* Serialization

### java.util

* Collections Framework
* List – ArrayList, LinkedList,
* Set – HashSet, LinkedHashSet, TreeSet
* Map – TreeMap, ConcurrencyMap
* Iterator, ListIterator
* Sorting using Comparator and Comparable
* Method References – overview and example
* Properties, UUID, Random – overview and example
* Calendar, Locale – overview and example
* Regular Expressions

## Day 9 – Java Inbuilt packages

### java.util.stream

* What is a stream?
* Collections vs Streams
* Creating Streams
* Different types of streams
* Intermediate Operations on Streams
  + map(), filter(), sorted(), flatMap()
* Terminal Operations on Streams
  + reduce(), forEach(), findFirst(), match(), collect(), count()
* Converting a Stream to a collection or Array
* Numeric Streams – IntStream,DoubleStream, LongStream

### java.util.concurrent

* Overview of concurrency API
* Executors
  + Executor Interfaces
  + Thread Pools
  + Using Callable and Future

## Day 10 – Java Inbuilt Packages

### java.nio

* Overview of Java NIO
* Channels, Buffers & Selectors
* Channel Implementations
  + FileChannel
* Usage of Buffer
  + Buffer Types
  + Allocating a buffer
  + Writing data to a buffer
  + Reading data from a buffer
* Scattered Reads & Gathering Writes
* Channel to Channel Transfers
* Usage of Selectors
  + Creating a selector
  + Registering channels with the selector
  + Selecting Channels via a selector
* Using AsynchronousFileChannel
  + Reading data through Future and Completion Handler
  + Writing data through Future and Completion Handler

### java.time

* Why java Date/Time API
* LocalDate and LocalTime
* Time zones and time stamps
* Temporal Adjustments
* Period and Duration
* Formatting and parsing
* Conversion between different date/time objects

## Day 11 – JDBC (Java SQL Package)

### JDBC

* JDBC overview
* java.sql interfaces Driver, Connection, Statement
* Loading a driver and establishing a connection using DriverManager
* Perform CRUD operations using JDBC interfaces
* Prepared Statement for precompiled queries

## Day 12 – Maven

### Introduction to Maven (version – 3.3.3)

* What is a build tool?
* Overview of Maven
* Environment Setup
* Maven POM File
* Creating a java project using maven
* Maven Directory Structure
* Project Dependencies
  + External Dependencies
  + Snapshot dependencies
* Maven Repository – Local, Central, Remote
* Build Lifecycle, phases and goals
* Executing the mvn command

## Day 13 – Unit Testing with JUnit (Version 5.0)

### Introduction to Testing

* Why Testing
* Overview of Junit
* Junit 5 Architecture
* Environment setup

### Working with JUnit 5

* Creating Test cases
* JUnit 5 Annotations
* JUnit Assertions
* Assumptions
* Using @Test in Junit5
* Using Annotations - @BeforeAll and @AfterAll
* TestFixtures with @BeforeEach and @AfterEach
* Testing Exceptions using assertThrows
* Combining Test Cases as TestSuite
* Using @RepeatedTest
* Tagging and filtering

## Day 14 – Testing using Mockito API

### Mockito Framework (version – 2.2.26)

* Overview of Mockito and mock objects
* Using Mockito API
* Adding mockito to a project
* Creating mock objects using @Mock Annotation
* Configuring mock objects
* Dependency Injection using @InjectMocks
* Adding behaviour
* Verify the behaviour using verify()
* Verify the call order
* Handling Exceptions
* Wrapping the java objects using @spy or spy()

## Day 15 – SL4J and Logback

### Introduction to SL4J (version - 1.7.23)

* What is logging?
* Introduction to SL4J
* When to use SL4J?
* Binding with different logging frameworks
* Using SL4J with logback logger
* What is Logback?
* Architecture & Configuration
* Logger, Appenders and Layouts
* Parameterized logging
* Logging Separation

## Day 16 & 17 – Design Patterns & Principles

### Overview of Design Pattern

* Overview of creational, structural, behavioral, concurrency design pattern

### SOLID Design Principles

* Introduction to the SOLID design principles
* Violations of SOLID design principles
* Introduction to Code Smells
* Refactoring techniques

## Day 18 –HTML5

### Introduction to HTML5

* Introduction of HTML5
* HTML file structure, elements, attributes
* <head> and <body > element
* Use of <script>, <style>, <meta><title> tags
* Doctype declaration

### Formatting tags, Links & Lists

* Formatting and Heading tags
* External vs internal links - using <a> tag
* Adding Images to a webpage
* Ordered, Unordered & Description List

### Tables

* Creating tables - <table>, <tr><thead><td>
* Use of <legend> and <fieldset>

### Forms

* Use of <form> tag
* Form elements - Textfield, Radio button, checkbox, Textarea, dropdown
* Submit & Reset buttons
* New Form Elements – output, datalist
* New Input Types and attributes

### Media Elements

* Audio and video tags

### Overview of canvas

## Day 19 –CSS

### Cascading Style Sheet (CSS)

* Introduction to css
* CSS Rules & Selectors
* Internal, External, Inline Stylesheet
* Working with background, text, font
* Styling List and Link
* Using ID & Class
* Floating Elements using CSS
* CSS positioning
* Overview of BOX Model and transitions
* Cross Browser compatibility issues and solutions

## Day 20 – JavaScript

### Introduction to JavaScript

* Introduction to JavaScript
* Syntax and structure

### JavaScript deep dive

* The HTML Document and JavaScript
* Data types, Variables, Operators
* Control Structures, Block, Loops, for - in
* Different types of dialog box (alert, confirm, prompt)
* Using Functions

### Event Handling

* Introduction to Event Handlers
* Event Handlers as JavaScript Methods
  + Onclick, onload, onkeyup
* Using Inner HTML with DOM in div tags for event Handling

### Form validation using DOM

## Day 21 – JavaScript Objects, Basics of JSON, XML, AJAX

### JavaScript Objects

### Objects

* Objects in JavaScript
* Inbuilt Objects – Number, Boolean, String, Array, Date, Math
* User-defined Objects – Object Literals
* User-defined Objects – Using Function Constructor
* Properties, Methods of Objects
* Modifying and accessing Object's properties/methods

### Understanding DOM

* Handling Window, Document, History, Navigator objects

### Using Cookie

### Web storage API for HTML

* LocalStorage and SessionStorage

### JSON

* Introduction to JavaScript Object Notation (JSON)
* JSON Datatypes & Objects
* Creating a JSON File
* Using parse() and Stringify() method
* Using JSON with Java – Encoding and Decoding

### Overview of XML

### Overview of AJAX

## Day 22 – Java EE

### Overview of different Architectures

* Introduction to different architectures
* Layers vs tiers
* Use of presentation, business, resource tiers
* Multitier Architecture
* What is JEE Architecture? Why JEE?
* Different types of JEE Architecture
* Introduction to MVC Architecture

### Overview of JEE technologies

* Deep dive into JEE
* Understand where each technology fits in JEE Architecture
* What is war, jar and ear
* Application Server vs Webserver

### Introduction to Servlet API

* Structure of web application
* Request and Response Model
* Servlet Lifecycle
* Types of Servlets
* Methods to get form data
* Developing, Packaging and deploying web application

## Day 23 – Java EE

### Session tracking in Servlets

* Working with HTTP Session object
* Tracking session using cookies
* Implementing Session Tracking

## Java Server Pages

### Developing Java Server Pages

* Introduction to JSP
* JSP lifecycle
* JSP Scripting Elements
* <@ include> and <jsp:include>
* JSP Implicit Objects
* Handling Exception in JSP pages

## Day 24 – Java Server Pages

### Using Expression Language

### Tags in JSP

* Working with JSTL tags
* Core Tags in detail
* Example for Function and formatting tags example
* Creating Java-based/JSP based Custom Tags

## Day 25 – Web Services & REST

### Introduction to web services

* What are web services?
* Service-oriented Architecture
* Architecture of web services
* Types of web services -BIG and REST

### Introduction to REST

* Introduction to REST
* REST Architecture
* HTTP Methods
* Producing and Consuming a restful web service
* Use of @Path, @QueryParam, @PathParam
* Invoking a restful web service

## Day 26 - JCR & Jackrabbit

### Understanding Content

* What is Content?
* Processes of Content Management
* Content Management Systems
  + Content management application
  + Content delivery application

### Java Content Repository

* What is JCR
* Need for JCR API
* Content Repository Model

### Apache Jackrabbit

* How Jackrabbit works
* Jackrabbit Architecture
* Configuring Jackrabbit
  + Repository Home Directory
  + Repository configuration file
* What is Object Content Mapping?

## Day 27 - Modularity & OSGi

### Modularity Concepts

* What is Modularity?
* Modularity vs Object Orientation

### Introduction to OSGi

* What and Why of OSGi
* An architectural overview of OSGi
* Hello World Examples with Module, Lifecycle & Service Layers

### OSGi Bundles

* Introduction to bundles
* Basics of Bundle Life-cycle

### OSGi Services

* What, why & when of Services
* Concepts of Publishing a service
* Concepts of Finding & Binding Services

### OSGi and Components

* What & why of components
* Overview Service-oriented Component Model (Conceptual only)

## Day 28 [Half-day] - NoSQL databases

### NoSQL Database

* NoSQL - When & Where
* NoSQL - Pros & Cons
* Types of NoSQL Database (Concepts only)
  + Column, Document, Key-Value, Graph, Multi-Model

### Document Oriented Database

* Documents - Keys, Retrieval & Organization
* Comparison with Relational Databases

### *Suggested Self-Study topics in NoSQL databases*

* Concepts of MongoDB or Cassandra

## Day 28 [Half-day] - Server Side Scripting Basics

### Server-side Scripting

* What is Server-side Scripting?
* Server-side vs Client-side Scripting

### Server-side Scripting in Java

* Java Server Pages vs Scripting for the Java platform
* Sneak-peak into javax.script

### Server-side JavaScript

* Basic Concepts